WHAT IS CLAIMED IS:

1. A fluidic logic device comprising:

an elastomeric block; and

a plurality of microfabricated channels formed in the elastomeric block, each channel containing a pressure or flow representing a signal, a change in the pressure or flow in a first channel resulting in a change in the pressure or fluid flow in a second channel consistent with a logic operation.

2. The device of claim 1, where the change in pressure or flow in the second channel is nonlinear with respect to the pressure or fluid flow changes in the first channel.

3. The device of claim 1 wherein a one way valve is positioned in at least one of the first channel and the second channel.

4. The device of claim 3 wherein:

the second channel comprises an inlet in communication with an outlet through a flow restrictor, the second channel including a junction upstream of the flow restrictor; and

the first channel comprises at least two control channels connected at the junction through one-way valves, such that pressures of the control channels are reflected at the outlet consistent with an AND-type truth table.

5. The device of claim 1 wherein:

the second channel comprises an inlet portion and an outlet portion; and

the first channel comprises at least two control channels adjacent to the first channel and separated from the first channel by respective first and second elastomer membranes, such that application of pressures to the control channels deflects at least one of the first and second membranes into the flow channel to reflect a pressure at the outlet consistent with a NOR-type truth table.

6. The device of claim 1 wherein:

the second channel comprises first and second inlet portions that merge to form an outlet portion; and

the first channel comprises first and second control channels adjacent to the first and second inlet portions, the first control channel separated from the first and second inlet portions by respective first and second membranes, and the second control channel separated from the first and second portions by respective third and fourth membranes, such that application of control pressures to the first and second control

channels deflects at least one of the first, second, third, and fourth membranes into the first and second inlet portions to reflect a pressure at the outlet consistent with a NOR-type truth table.

7. The device of claim 6 further comprising an amplification structure positioned between the first channel and at least one of the first, second, third, and fourth membranes.

8. The device of claim 1 wherein an outlet of the second channel is in fluid communication with a first channel of a second fluidic logic device.

9. A pressure amplifier comprising:

an elastomeric block formed with first and second microfabricated recesses therein; and

an amplifier structure having a first surface area in contact with the first recess and a second surface area in contact with the second recess, the first surface area larger than the second surface area such that a pressure in the first recess is communicated by the amplifier structure as an amplified pressure to the second recess.

10. The pressure amplifier of claim 9 wherein the first recess comprises a control channel.

11. The pressure amplifier of claim 9 wherein the second recess comprises a flow channel.

12. The pressure amplifier of claim 9 wherein the amplifier structure is a rectangular pyramid.

13. The pressure amplifier of claim 9 wherein the amplifier structure is a cone.

14. A method of amplifying a pressure in a flow channel of a microfabricated elastomer structure, the method comprising:

providing an elastomer block including a first recess in contact with a first area of an amplifier structure and second recesses in contact with a second area of the amplifier structure;

applying a pressure to the first area; and

communicating the pressure to the second area, the second area smaller than the first area such that the pressure communicated to the second recess is amplified.

15. The method of claim 14 wherein the first recess is a control channel and the pressure is applied by pressurization of the control channel.

16. The method of claim 14 wherein the second recess is a flow channel and the amplified pressure is employed to control a flow of fluid through the flow channel.

17. A one-way valve comprising a microfabricated channel formed in an elastomeric block, a flap integral with the elastomeric block projecting into the channel and blocking the channel, the flap deflectable to permit fluid to flow in only a first direction.

18. The one-way valve of claim 17 wherein the flap is integral with a ceiling portion of the channel.

19. The one-way valve of claim 14 wherein the flap is prevented from moving in a second direction opposite the first direction by a protuberance on a wall of the channel.

20. The one-way valve of claim 19 wherein the protuberance affords a portion of the channel a narrower cross section than the flap.

21. A method of filling a microfabricated elastomeric structure with fluid comprising:

providing an elastomer block having a flow channel, the elastomer block comprising an elastomer material known to be permeable to a gas;

filling the flow channel with the gas;

injecting a fluid under pressure into the flow channel; and

permitting gas remaining in the flow channel to diffuse out of the elastomer material.

22. The method of claim 21 wherein the elastomer is a silicone elastomer and the gas is air.

23. A method of metering a volume of fluid comprising:

providing a chamber having a volume in an elastomeric block separated from a control recess by an elastomeric membrane;

supplying a pressure to the control recess such that the membrane is deflected into the chamber and the volume is reduced by a calibrated amount, thereby excluding from the chamber the calibrated volume of fluid.

24. The method of claim 23 wherein the calibrated volume of fluid is provided to a further microfluidic system.

25. The method of claim 23 further comprising:

providing a second fluid to an opening of the chamber; and

ceasing application of the pressure such that the membrane relaxes back to an original position and the calibrated volume of the second fluid is drawn into the chamber.

26. The method of claim 25 wherein the first fluid is a protein solution and the second fluid is a countersolvent, such that drawing the second fluid into the chamber changes a solubility of the protein.

27. The method of claim 26 further comprising the parallelization of multiple chambers with varying calibrated volumes.

28. The method of claim 26 further comprising the use of a parallel structure to rapidly determine optimal conditions for protein crystallization.

29. A protein crystallization system comprising:

an elastomeric block including a microfabricated chamber having a volume and receiving a protein solution; and

a microfabricated flow channel in fluid communication with the chamber, the flow channel receiving a countersolvent and introducing a fixed volume of countersolvent to the chamber.

30. The protein crystallization system of claim 29 comprising an isolation structure, the isolation structure configured to selectively isolate the chamber from the flow channel as the flow channel receives the a predetermined volume of countersolvent, and then to place the chamber into contact with the flow channel.

31. The protein crystallization system of claim 29 comprising a control channel overlying the chamber and separated from the chamber by a membrane, the membrane deflectable into the chamber to exclude a calibrated volume of protein solution, such that relaxation of the membrane draws the calibrated volume of the countersolvent into the chamber.

Sub B27 32. A method of promoting adhesion between layers of a microfabricated structure, the method comprising:

exposing a surface of a first component layer to a chemical;

exposing a surface of a second component layer to the chemical; and

placing the surface of the first component layer into contact with the surface of the second elastomer layer.

33. The method of claim 32 wherein the first and second component layers comprise silicone elastomers and the chemical comprises ethanol.

34. The method of claim 33 wherein the component layers are dried before being placed into contact.

35. The method of claim 32 wherein the first component layer comprises an elastomer and the second component layer comprises a glass substrate, the first and second component layers exposed to ethanol and dried before being placed into contact.

36. A method for actuating a microfabricated elastomer structure comprising:

providing an aqueous salt solution in a control recess formed in an elastomeric block and overlying and separated from a flow channel by an elastomer membrane; and

applying a potential difference to the salt solution to generate a gas, such that a pressure in the control recess causes the membrane to deflect into the flow channel.

37. The method of claim 36 wherein the gas diffuses out of the elastomeric block to permit the membrane to relax out of the flow channel.

38. The method of claim 36 wherein the gas is mechanically vented to permit the membrane to relax out of the flow channel.

39. A microfabricated syringe structure comprising:

a first chamber formed in an elastomeric block and including an aqueous salt solution, a first electrode, and a second electrode;

a second chamber formed in the elastomeric block and containing an inert liquid, the second chamber in fluid communication with the first chamber through a first flow channel;

a third chamber formed in the elastomeric block and containing an ejectable material, the third chamber in fluid communication with the second chamber through a second flow channel and in fluid communication with an environment through

an outlet, such that application of a potential difference across the electrodes generates gas in the first chamber, the gas displacing the inert material into the third chamber, the inert material displacing the injectable material into the environment.

40. A method of fabricating an elastomeric structure comprising:

cutting the first elastomer structure along a vertical section to form a first elastomer portion and a second elastomer portion; and

bonding the first elastomer structure to another component.

41. The method of claim 40 wherein the first elastomer layer is of a first type and the second elastomer layer is of a second type complementary to the first type, the method further comprising:

forming a second elastomer structure;

cutting the second elastomer structure along a vertical section to form a third elastomer portion and a fourth elastomer portion; and

bonding the first elastomer portion to the third elastomer portion to form a third elastomer structure.

42. The method of claim 41 wherein the third elastomer portion is of the second type and the fourth elastomer portion is of the first type.

43. The method of claim 40 wherein the other component is a membrane, and further comprising bonding a second elastomer structure to an opposite side of the membrane than the first elastomer structure is bonded to.